wherein said peripheral region of said plasma processing chamber does not include any points of said top region of said plasma processing chamber.

2. A plasma processing system as recited in claim 1, wherein the at least two different regions include a top central region and an upper peripheral region.

3. A plasma processing system as recited in claim 1, wherein the at least two different regions include a top central region and a lower peripheral region.

4. A plasma processing system as recited in claim 1, wherein the at least two different regions include a top central region, a lower peripheral region, and an upper peripheral region.

5. A plasma processing system as recited in claim 1, wherein the at least two different regions include a lower region near the substrate.

6. A plasma processing system as recited in claim 1, wherein the plasma processing system includes a chuck and the least two different regions include a lower region near edges of the substrate, and

wherein the input gas is released through the chuck.

7. A plasma processing system as recited in claim 1, wherein said flow system controls amount or volume of the input gas into the at least two different regions of said plasma processing chamber.

8. A plasma processing system as recited in claim 1, wherein said flow system controls flow rate of the input gas into the at least two different regions of said plasma processing chamber.

9. A plasma processing system as recited in claim 1, wherein the input gas includes at least first and second gases, and

wherein said flow system independently controls relative flow rate of the at least first and second gases into the at least two different regions of said plasma processing chamber.

10. A plasma processing system as recited in claim 1,

wherein said plasma processing system further comprises a gas delivery ring that is coupled to said plasma processing chamber, and

wherein said flow system controls amount or volume of the input gas to said gas delivery ring, thereby supplying the input gas to a peripheral region of said plasma processing chamber.

11. A plasma processing system as recited in claim 10, wherein said gas delivery ring is provided on an upper portion of the plasma processing chamber, thereby the gas delivery ring supplying the input gas to an upper peripheral region of said plasma processing chamber.

12. A plasma processing system as recited in claim 1, wherein said plasma processing chamber includes at least an inner wall, and the gas flow system comprises:

at least one gas inlet for receiving the input gas that is to be delivered into said plasma processing chamber;

at least first and second gas outlets that are each capable of delivering the input gas to the plasma processing system; and

wherein at least a portion of the input gas is delivered to the plasma processing chamber via said first and second gas outlets.

13. A plasma processing system as recited in claim 12, wherein the at least a portion of the input gas is released into a second region, the first region being a top central region within the plasma processing chamber, and the input gas that is released into the first region is delivered by the first gas outlet.

14. A plasma processing system as recited in claim 12, wherein the at least a portion of the input gas is released into a second region, the first region being an upper peripheral region that surrounds the inner wall of the plasma processing chamber, and the input gas that is released into the second region is delivered by the second gas outlet.

15. A plasma processing system as recited in claim 12, wherein the at least a portion of the input gas is released into a second region, the second region being a lower peripheral region that surrounds the inner wall of the plasma processing chamber, and the input gas that is released into the second region is delivered by the second gas outlet.

16. A plasma processing system as recited in claim 12, wherein the gas flow system receives a gas flow control signal for determining the amount or volume of the input gas that is delivered into the plasma processing chamber by each one of the first and second gas outlets.

17. A plasma processing system as recited in claim 16, wherein the gas flow control signal determines the flow rate of delivery of gas by each of the first and second gas outlets into the plasma processing chamber.

18. A plasma processing system as recited in claim 16, wherein the input gas includes at least first and second gases, and

wherein said flow control signal independently determines relative flow rate of the at least first and second gases into the at least two different regions of said plasma processing chamber.

19. (Twice Amended) A plasma processing system for processing a substrate, comprising:

a substantially cylindrical plasma processing chamber within which a plasma is both ignited and sustained for said processing, said plasma processing chamber having no separate plasma generation chamber, said plasma processing chamber having an upper end and a lower end;

a coupling window disposed at an upper end of said plasma processing chamber.

an RF antenna arrangement disposed above a plane defined by said substrate when said substrate is disposed within said plasma processing chamber for said processing;

an electromagnet arrangement disposed above said plane defined by said substrate, said electromagnet arrangement being configured so as to result in a radial variation in the static magnetic field topology within said plasma processing chamber in

the region proximate said RF antenna when at least one direct current is supplied to said electromagnet arrangement, said radial variation being effective to affect processing uniformity across said substrate;

a dc power supply coupled to said electromagnet arrangement, said dc power supply having a controller to vary a magnitude of said at least one direct current, thereby changing said radial variation in said magnetic field topology within said plasma processing chamber in said region proximate said antenna to improve said processing uniformity across said substrate; and

a gas flow system coupled to said plasma processing chamber, said gas flow system controlling flow of input gas into at least two different regions of said plasma processing chamber, said input gas being a source gas suitable for use to etch said substrate in said plasma processing chamber;

wherein said at least two different regions include at least one peripheral region and at least one top region of the plasma processing chamber; and

wherein said peripheral region of said plasma processing chamber does not include any points of said top region of said plasma processing chamber.

20. A plasma processing system as recited in claim 19, wherein the at least two different regions include a top central region and an upper peripheral region.

21. A plasma processing system as recited in claim 19, wherein the at least two different regions include a top central region and a lower peripheral region.

22. A plasma processing system as recited in claim 19, wherein the at least two different regions include a top central region, a lower peripheral region, and an upper peripheral region.

23. A plasma processing system as recited in claim 19, wherein said flow system controls amount or volume of the input gas into the at least two different regions of said plasma processing chamber.

24. A plasma processing system as recited in claim 19, wherein said flow system controls flow rate of the input gas into the at least two different regions of said plasma processing chamber.

25. A plasma processing system as recited in claim 19, wherein the input gas includes at least first and second gases, and

wherein said flow system independently controls relative flow rate of the at least first and second gases into the at least two different regions of said plasma processing chamber.

26. A plasma processing system as recited in claim 19, wherein said plasma processing system further comprises a gas delivery ring that is coupled to said plasma processing chamber, and

wherein said flow system controls amount or volume of the input gas to said gas delivery ring, thereby supplying the input gas to a peripheral region of said plasma processing chamber.

27. A plasma processing system as recited in claim 26, wherein said gas delivery ring is provided on an upper portion of the plasma processing chamber, thereby the gas delivery ring supplying the input gas to an upper peripheral region of said plasma processing chamber.

28. A plasma processing system as recited in claim 19, wherein said plasma processing chamber includes at least an inner wall, and the gas flow system comprises:

at least one gas inlet for receiving the input gas that is to be flown into said plasma processing chamber;

at least first and second gas outlets that are each capable of delivering the input gas to the plasma processing system; and

wherein at least a portion of the input gas is delivered to the plasma processing chamber via said first and second gas outlets.

29. A plasma processing system as recited in claim 28, wherein the at least a portion of the input gas is released into a second region, the first region being a top central region within the plasma processing chamber, and the input gas that is released into the first region is delivered by the first gas outlet.

30. A plasma processing system as recited in claim 28, wherein the at least a portion of the input gas is released into a second region, the first region being an upper peripheral region that surrounds the inner wall of the plasma processing chamber, and the input gas that is released into the second region is delivered by the second gas outlet.

31. A plasma processing system as recited in claim 28, wherein the at least a portion of the input gas is released into a second region, the second region being a lower peripheral region that surrounds the inner wall of the plasma processing chamber, and the input gas that is released into the second region is delivered by the second gas outlet.

32. A plasma processing system as recited in claim 28, wherein the gas flow system receives a gas flow control signal for determining the amount or volume of the input gas that is delivered into the plasma processing chamber by each one of the first and second gas outlets.

33. A plasma processing system as recited in claim 32, wherein the gas flow control signal determines the flow rate of delivery of gas by each of the first and second gas outlets into the plasma processing chamber.

34. A plasma processing system as recited in claim 32, wherein the input gas includes at least first and second gases, and

wherein said flow control signal independently determines relative flow rate of the at least first and second gases into the at least two different regions of said plasma processing chamber.

35. A plasma processing system as recited in claim 19, wherein the at least two different regions include a lower region near the substrate.

36. A plasma processing system as recited in claim 19, wherein the plasma processing system includes a chuck and the least two different regions include a lower region near edges of the substrate, and

wherein the input gas is released through the chuck.

37. (Twice Amended) A plasma processing system for processing a substrate, comprising:

a substantially cylindrical plasma processing chamber within which a plasma is both ignited and sustained for said processing, said plasma processing chamber having no separate plasma generation chamber, said plasma processing chamber having an upper end and a lower end;

a coupling window disposed at an upper end of said plasma processing chamber.

an RF antenna arrangement disposed above a plane defined by said substrate when said substrate is disposed within said plasma processing chamber for said processing;

an electromagnet arrangement disposed above said plane defined by said substrate, said electromagnet arrangement being configured so as to result in a radial variation in the static magnetic field topology within said plasma processing chamber in the region proximate said RF antenna when at least one direct current is supplied to said electromagnet arrangement, said radial variation being effective to affect processing uniformity across said substrate;

a dc power supply coupled to said electromagnet arrangement, said dc power supply having a controller to vary a magnitude of said at least one direct current, thereby changing said radial variation in said magnetic field topology within said plasma processing chamber in said region proximate said antenna to improve said processing uniformity across said substrate; and

a gas flow system coupled to said plasma processing chamber, wherein said gas flow system controls release of input gas, suitable for etching the substrate, into a first and a second region within said plasma processing chamber, said first region being a top central region within said plasma processing chamber and said second region being a peripheral region of said plasma processing chamber; and

wherein said first and second regions do not have any points in common.